History

An 8-year-old spayed female domestic longhair cat was referred to Auburn University Small Animal Teaching Hospital for evaluation of abdominal distension. Two years earlier, a diagnosis of chronic renal failure had been made, and the cat was receiving fluids SC every 2 weeks. Three weeks prior to the referral evaluation, the owners noted the development of abdominal distension and that the cat had decreased appetite, activity, and frequency of bowel movements.

Clinical and Gross Findings

On physical examination, the cat was quiet and lethargic and had signs of depression; the eyes were sunken, and pinching the skin resulted in a slight skin tent. On the basis of these findings, the cat was estimated to be 5% dehydrated. Abdominal palpation elicited signs of pain, and an abdominal fluid wave was detected. A large, firm, irregular mass was palpated in the area of the spleen, but detailed interpretation was not possible because of severe ascites. Serum biochemical analysis revealed hypoproteinemia (5.84 g/dL; reference interval, 6.2 to 7.7 g/dL), hyperbilirubinemia (0.6 mg/dL; reference interval, 0.1 to 0.2 mg/dL), azotemia (creatinine concentration, 3.1 mg/dL [reference interval, 0 to 2.0 mg/dL]; SUN concentration, 57.9 mg/dL [reference interval, 5 to 30 mg/dL]), hyperglycemia (140 mg/dL; reference interval, 58 to 116 mg/dL), and low serum iron concentration (34 µg/dL; reference interval, 48 to 175 µg/dL). Hematologic abnormalities included nonregenerative anemia (Hct, 25.9%; reference interval, 30% to 45%), neutrophilia (12.6 X 10^3 neutrophils/µL; reference interval, 2.5 X 10^3 neutrophils/µL to 12.5 X 10^3 neutrophils/µL), and lymphopenia (0.403 X 10^3 lymphocytes/µL; reference interval, 1.5 X 10^3 lymphocytes/µL to 7.0 X 10^3 lymphocytes/µL). A fluid sample was collected via abdominocentesis for microscopic examination; on the basis of these findings, the fluid was classified as a high-protein transudate (nucleated cell count < 5,000 cells/µL; protein concentration, 3.1 g/dL) with 80% nondegenerate neutrophils, 18% macrophages, and 2% small lymphocytes, but no infectious organisms or neoplastic cells were seen. Abdominal ultrasonography revealed a markedly enlarged spleen (from which fine-needle aspirate samples were collected) with variable echogenicity, a small left kidney, an enlarged right kidney (twice the size of the left kidney) with mild hydronephrosis, bilateral adrenal gland enlargement of uncertain relevance, and a mildly coarse, hyperechoic liver. Thoracic radiography did not reveal abnormalities. Splenectomy and liver biopsies were performed following cytologic evaluation of the splenic aspirate samples. At surgery, the spleen was diffusely enlarged, dark red to gray, and firm. It was comma shaped, had rounded edges, was approximately 10.0 X 5.0 X 3.0 cm, and was covered by strands of fibrin (Figure 1).

Figure 1—Photograph of the markedly enlarged spleen removed during surgery from a cat that was evaluated because of abdominal distension and decreased appetite, activity, and frequency of bowel movements. The spleen has been fixed in formalin; it is comma shaped and has rounded edges. Notice the presence of fibrin strands and icteric perisplenic adipose tissue. Bar = 3 cm.
Histopathologic and Cytologic Findings

Microscopically, smears of the ultrasound-guided fine-needle aspirate samples obtained from the spleen were densely cellular and consisted primarily of well-granulated mast cells. The mast cells had mild anisocytosis and anisokaryosis with rare binucleation (Figure 2). Following splenectomy, histologic examination of sections of spleen tissue revealed complete obliteration of normal parenchyma by neoplastic round cells (Figure 3). The cells had a moderate amount of granular, poorly stained cytoplasm and large, round, vesicular, hyperchromatic nuclei with margined chromatin and prominent nucleoli. The cytoplasmic granules were metachromatic after staining with periodic acid-Schiff or toluidine blue stain. The mitotic rate was moderate, with 3 mitoses/5 (400X) fields. The splenic capsule was thickened by layers of fibrin. Histologic examination of liver biopsy specimens revealed randomly distributed, multifocal nodular masses composed of neoplastic round cells similar to those seen in the spleen (Figure 4).

Morphologic Diagnosis and Case Summary

Morphologic diagnosis and case summary: splenic mast cell tumor with metastasis to the liver in a cat.

Comments

The case described in the present report was consistent with visceral mast cell tumor of cats. One study indicated that mast cell disease is the most common splenic disease of cats, accounting for 66 of 455 (approx 15%) cases of feline splenic disease over a 6-year period. Ages of cats reported to have mast cell disease range from 3 to 16 years, with no apparent sex predilection. Feline mastocytosis exists in 2 forms that can occur simultaneously but are considered to be separate diseases. The more common form is cutaneous mast cell tumors, whereas systemic mastocytosis is the visceral form of the disease. Systemic mastocytosis is characterized by primary involvement of the spleen or intestines. For cats, it has been reported that approximately 20% of all mast cell tumors occur primarily in the spleen, with metastasis to the liver, lymph nodes, bone marrow, and lungs. The most common clinical signs include decreased appetite, vomiting, and diarrhea, all of which are often caused by gastric or duodenal ulceration. Ulceration of the gastrointestinal tract is thought to be due to excessive histamine production by the neoplastic mast cells.

Results of cytologic examination of fine-needle aspirate samples obtained from an affected organ are usually diagnostic, and additional procedures for disease staging include radiography, cytologic examination of bone marrow aspirate samples and Buffy coat smears, and histologic examination of biopsy specimens of affected tissues. Mastocytosis, anemia, and bone marrow involvement may be present. Unlike dogs, mastocytosis in cats is limited to those cats with mast cell tumors and is most frequently asso-
Located with the splenic visceral form. Abdominal ultrasonography is useful for identifying splenomegaly. Ultrasonographically, the spleen of a cat with systemic mastocytosis has been described as either diffusely hypoechoic or nodular or mottled. Similar findings have been described in lymphoproliferative and myeloproliferative diseases. Therefore, these diseases cannot be differentiated solely on the basis of ultrasonographic findings. Abdominal effusion is common with splenic mastocytosis; however, abdominal effusion is a nonspecific finding that has also been reported in association with other hematologic neoplasms.

Often, splenectomy results in marked clinical improvement, including a resolution of emesis, and survival time for cats with mastocytosis following splenectomy can be as long as 38 months. Administration of antihistamines for at least 48 hours before surgery is performed is highly recommended. Chemotherapy (lomustine administration) appears to be ineffective when administered as a primary treatment to cats with splenic mast cell tumor or as a treatment for secondary cutaneous mast cell tumors following splenectomy. Despite improvement following splenectomy, the median survival time of cats with visceral mastocytosis is short (283.5 days), and prognosis should therefore be guarded. Death or euthanasia is often the result of anaphylactoid reaction or gastrointestinal tract hemorrhage and perforation.

The cat of the present report was evaluated because of signs of depression, lethargy, and ascites, rather than because of emesis. There was no evidence of mastocytemia. The low serum iron concentration was attributed to sequestration of blood in the spleen as a result of chronic inflammation. Multiple factors, including dehydration, mild chronic renal disease, chronic inflammation, and possible gastrointestinal bleeding, were believed to contribute to the azotemia, hypoproteinemia, and anemia in the cat of this report. Hyperglycemia, neutrophilia, and lymphopenia were consistent with stress. The high total bilirubin concentration was consistent with mild intrahepatic cholestasis and could have been associated with infiltration of the liver by neoplastic cells. Ultrasonographically, the spleen was described as enlarged with variable echogenicity. The definitive diagnosis of mast cell tumor was made on the basis of cytologic and histopathologic findings. It was suspected that gastric or intestinal hemorrhage may have occurred. The cat was euthanized 2 days after splenectomy because of the continued decline of its clinical condition. A necropsy was not permitted.

References